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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/680,052	10/05/2000	Simon Haig Melikian	Imaging 1	7329

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EXAMINER	
CHANG, JON CARLTON	

ART UNIT	PAPER NUMBER
2623	14

DATE MAILED: 04/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/680,052	MELIKIAN ET AL.	
	Examiner	Art Unit	
	Jon Chang	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *1/12/04*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-29* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,5,12,15-18,21,23 and 26-29* is/are rejected.

7)☒ Claim(s) *3,4,6-11,13,14,19,20,22,24 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Applicants' Amendment and Arguments

1. The amendment filed January 12, 2004, has been entered and made of record.

The objection to the drawings is withdrawn in response to the filing of corrected drawings.

The rejection under 35 U.S.C. § 112, second paragraph, is withdrawn in response to the amendment.

With regard to the prior art rejections, Applicants argue that none of the applied references disclose or suggest Applicants' claimed use of contours. The Examiner disagrees for at least the following reasons. Ballard does teach the claimed use of contours. In section 4.3, for example, Ballard examines the "boundary points of the shape" and at each boundary point, the gradient direction is computed. The boundary is equivalent to the claimed contour. Note also Fig. 6 which shows the contour of an arbitrary shape. MacDonald as well, teaches contours. MacDonald teaches edges or lines which define an object or pattern (column 4, line 52; column 5, line 7; column 5, lines 15-16). MacDonald further teaches that such an edge is known as a contour line (column 3, line 29). Therefore, MacDonald is seen to disclose the claimed contours.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 5, 15-18 are rejected under 35 U.S.C. 102(b) as being anticipated by the article, "Generalizing the Hough Transform to Detect Arbitrary Shapes" by Ballard.

Regarding claim 1, Ballard discloses a method for locating a pattern, comprising:

providing a pattern image corresponding to the pattern to be located (section 4.3, first two paragraphs);

extracting at least one pattern contour from the pattern image (section 4.3, first paragraph; the boundary is a contour);

generating vector information for each of said at least one pattern contours, relative to a reference point (section 4.3, second and third paragraphs);

creating at least one reference table for storing the vector information, each of said at least one reference tables corresponding to said at least one pattern contour (section 4.3, second and third paragraphs);

providing a scene image, which will be searched for the pattern (section 4.3, fourth paragraph);

extracting at least one scene contour from the scene image (section 4.3, fifth paragraph);

generating vector information for each of said at least one scene contours (section 4.3, fifth paragraph); and

determining whether the pattern has been located within the scene image using the at least one reference tables and the vector information for the at least one scene

contours, and if so, identifying a location of the pattern within the scene image and an angle of rotation of the pattern within the scene image (section 4.3, fourth and fifth paragraphs; section 4.4; section 4.5, first and second paragraphs).

As to claim 5, Ballard discloses the method of claim 1, wherein the step of generating vector information for each of said at least one pattern contours comprises:

selecting a reference point for each of said at least one pattern contours (section 4.3, first and second paragraphs); and

generating vector information for each of said at least one pattern contours, relative to the selected reference point (section 4.3, first and second paragraphs).

As to claim 15, Ballard discloses the method of claim 1, wherein the step of determining whether the pattern has been located comprises:

calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points (section 4.3, e.g., boundary points);

calculating at least one potential angle of rotation based on the extracted scene contour vector information and recording the instance of each of said at least one potential angles of rotation (section 4.3, fifth paragraph; note indexing on Φ);

identifying a location of the pattern within the scene image using the recorded potential reference points (section 4.3, fourth and fifth paragraphs); and

determining an angle of rotation for the pattern within the scene image using the recorded potential angles of rotation (section 4.3, fourth and fifth paragraphs; section 4.5, first and second paragraphs).

Regarding claim 16, Ballard discloses the method of claim 15, wherein the step of calculating at least one potential reference point comprises:

calculating a potential reference point for each point in the reference table (section 4.3, fifth paragraph).

With regard to claim 17, Ballard discloses the method of claim 16, wherein the potential reference point is calculated from the angles and the vector information (section 4.3).

As to claim 18, Ballard discloses the method of claim 15, wherein the step of calculating at least one potential reference point based on the extracted scene contour vector information and recording the instance of each of said at least one potential reference points comprises:

adding the potential reference point to a reference point accumulator (section 4.3, fifth paragraph).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ballard.

Claim 26 is a system which corresponds to the method of claim 1, therefore the remarks provided above for claim 1 are applicable to claim 26 for their common features. Ballard is silent with regard to a system. However, it would have been obvious to utilize some sort of system, e.g., a computer-based system, to implement Ballard's method. To implement the method without a system, would be impractical, if not extremely difficult. Typically, methods involving the Hough Transform, shape recognition, image processing, etc., to which Ballard is relevant (see abstract and keyword list) involve use of a system to implement (Official Notice). A computer-based would provide the processor and means for performing the steps of the method.

With regard to the first image capture device that captures a pattern image, the pattern image including an image of a pattern, and the second image capture device that captures a scene image to be searched for the pattern, while not taught explicitly by Ballard, this is considered obvious over Ballard. The shape represented by the R-table is somehow inputted into the system. The scene image is somehow obtained. Image

capture devices are well known in the art for inputting shape patterns and for capturing images of scenes (Official Notice). It would have been obvious to utilize capture device sto capture a pattern image and a scene image in Ballard's method because this would allow inputting of real-world images which may be detected in real-world scenes, making it more practical.

With regard to claim 27, Ballard does not disclose a database storing the at least one reference table. The Examiner takes Official Notice that it is well known to utilize a database to store a table. It would have been obvious to utilize a database to store Ballard's table because this would make retrieval of the appropriate table for a particular shape more efficient.

Regarding claim 28, the number of tables stored in the database would be based upon designer preference. The designer would store a particular number of tables in the database to suit a particular need or application.

Regarding claim 29, to utilize different or common image capture devices as the first and second image capture devices is not seen as a patentable distinction. A user or designer would utilize image capture devices based on a particular application, or availability of the devices.

7. Claims 21 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 5,600,733 to MacDonald et al. (hereinafter "MacDonald") and U.S. Patent 5,033,099 to Yamada et al. (hereinafter "Yamada").

As to claim 21, MacDonald discloses a method for pattern recognition, comprising:

extracting pattern vector information from at least one pattern image, each pattern image having a pattern reference point (Figs.3B; column 3, lines 28-33);

storing the pattern vector information for each of the at least one pattern image (column 3, lines 36 and 59-61);

extracting scene contour information from a scene image (column 3, lines 37-38);

calculating a potential reference point based on the scene contour information and the reference table (column 3, lines 37-39);

matching the potential reference point with one of the at least one pattern reference points (column 3, lines 39-41); and

identifying a pattern image corresponding to the matching pattern reference point (column 3, lines 39-41; column 6, lines 31-37).

MacDonald does not describe storing the pattern vector information in a table, and thus does not disclose the claimed step of creating a reference table containing the pattern vector information. However, creating reference tables to store pattern vector information is well known in the art. For example, in an analogous environment, Yamada teaches storing vector information in a table (column 11, lines 58-61). Utilizing a table in MacDonald, as taught by Yamada, would improve identification speed due to faster lookup. Therefore, it would have been obvious to one of ordinary skill in the art to modify MacDonald according to Yamada.

As to claim 23, MacDonald discloses the method of claim 21, wherein the pattern vector information includes a rotation invariant angle (since the vectors are distributed uniformly, column 4, lines 45-47, the angles are fixed and would not vary under rotation of the pattern).

8. Claims 2 and 12 rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Ballard and U.S. Patent 5,943,441 to Michael.

Regarding claims 2 and 12, Ballard is silent with regard to the details of extracting the contours. Michael teaches a method for extracting contours comprising:

locating at least one edge in the image (column 2, lines 53-54);

recording a starting point for the at least one edge (note title);

crawling along the at least one edge of the image ("contour tracking", column 2, line 44);

extracting a plurality of pixels from the at least one edge, beginning with the starting point and continuing with pixels identified while crawling along the at least one edge (column 2, lines 61-64) ;

filtering the plurality of extracted pixels (column 8, lines 20-22); and

creating a pattern contour from the plurality of extracted pixels (column 2, lines 56-57).

Since Ballard is silent as to how the contours are extracted, it would have been obvious to one of ordinary skill in the art to look to the prior art for an appropriate method of extracting contours. Michael's technique has several advantages, including

being more robust against object/background misclassification (column 2, lines 33-34). This would improve pattern detection in Ballard's method, and therefore it would have been obvious to one of ordinary skill in the art to utilize Michael's technique in Ballard's method. It would have further been obvious to utilize the Michael's contour extraction on either pattern or scene images.

Allowable Subject Matter

9. Claims 3-4, 6-11, 13-14, 19-20, 22 and 24-25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Reference Cited

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 4,901,362 to Terzian discloses a method of recognizing patterns which extracts an outline of an object, represents the object by a set of radial vectors emanating from the centroid of the object, and compares the set of radial vectors to known sets of vectors in a memory.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jon Chang whose telephone number is (703)305-8439. The examiner can normally be reached on M-F 8:00 a.m.-6:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703)308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jon Chang
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Art Unit 2623

Jon Chang
March 31, 2004